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Fireproof Steel and Concrete Buildings.

BY LEWIS A. HICKS.

It has been ascertained that the steel buildings stood up under the shock and fire while the stone and brick buildings toppled. These great modern steel and re-inforced concrete structures still have standing their walls intact and can be rapidly put in shape for the resumption of business. The most notable cases of partial immunity were the St. Francis Hotel, the Fairmount Hotel, the Monadnock Building, the Flood Building, the Shreve Building, the Crocker Building, the Mills Building, the Spreckles Building, the Chronicle Building and scores of other modern steel and concrete structures. The Fairmount Hotel, while seriously damaged in the interior, is left intact as to the walls.

It is apparent, therefore, that steel and re-inforced concrete will be the most important materials in the work of constructing the New City. My own examinations of several re-inforced buildings on filled ground that have gone through the shock without any injury, and of steel where protected by concrete, have shown me that there was no impairment by fire even under the most critical conditions. Light curtain walls of re-inforced concrete for exterior enclosures have shown themselves capable of successfully resisting the diagonal and heaving strains produced by the shock in the same way that the lattice girders in the Kohl Building have prevented distortion there. There can be no doubt in the mind of structural engineers who have had the opportunity of examining our tall buildings, that the known conditions which have caused this disaster can be safely provided against in the construction of the future.

It is fortunate that the construction of many large buildings was only in contemplation. Their erection, as well as rebuilding of destroyed structures, can now be pursued with the assurance of substantial construction. Indeed, the experience will result in making San Francisco the safest city in the country in which to reside.

When San Francisco is rebuilt no material damage by any future earthquake need be feared. Under the new laws all buildings will be reconstructed under requirements which will prevent indiscriminate erection of faulty structures.

The Citizens' Committee on Light and Power of which A. M. Hunt is Secretary, have their offices at the corners of Bush and Fillmore Sts., San Francisco.

It is estimated that the cost for contruction of a corrugated iron building covering a 50 x 137.6 foot lot will be $3000. This estimate was made to the Supervisors at a recent meeting by some of the architects present.

The State Mining Bureau, whose office is in the Ferry Building, San Francisco, has recently issued its Bulletin No. 38, "Structural and Industrial Materials of California," which will doubtless prove of value to architects and builders.

Market street property in a good location at the present time is worth five dollars per front foot per month. This is the price at which land owners are instructing real estate agents to sign leases.

These leases are only for a period ranging from six months to two years. In every instance the tenant has to erect his own temporary building.

The New Electric Light and Power Plant of the Mutual Electric Light Company.

BY J. H. HOPP

The new electric light plant of the Mutual Electric Light Company is situated on the corner of Spear and Folsom Streets, San Francisco, on a lot 127 feet six inches square. The plant was designed to accommodate six units of 1500 kilowatts capacity each, the intention being to install in the beginning two of these units, with necessary boilers and auxiliary machinery, in a building covering one-half the lot, and to so arrange the building that the additional four units could be added at any time without interfering with the operation of the plant. Owing to the shape of the lot the arrangement of the plant offered some difficulties, it being necessary, in order to get in the machinery desired, to place the boilers across one end of the lot, so arranging them that they could, when the capacity of the plant was increased, be built two tiers high, thus leaving the greater portion of the space availabe for the reception of the engines, generators and auxiliaries. It was recognized at the time that some disadvantage accrued from this arrangement, but in view of the large amount of space required by the generating sets no other seemed feasible.

Work was commenced on the plant early in July, 1904, and the plant was completed and in operation on March 22, 1905. The engines and generators had been ordered a year before work was first commenced on the actual building of the plant, and they were on the ground ready for installation some time before they were needed. During the time the plans for the station were in preparation a series of borings were made on the lot in order to determine the character of the ground. The ground was found to be very soft mud; at varying depths, averaging about forty-five feet, a ledge of hard rock was encountered. Upwards of 700 piles, twelve inches in diameter at the but, were used to support the

building and foundations for machinery.

The lower floor of the building, on which the auxiliary machinery is placed, is at a depth of about five feet below the mean high water mark; in consequence this floor is subjected to a considerable upward hydrostatic pressure. This in part accounts for the large number of piles used, it being necessary to firmly anchor this floor in order to prevent cracking and to maintain it in waterproof condition. The floor is of concrete, twelve inches thick, resting on piles spaced generally about three feet center to center, these piles being cut off to the level of six inches below the surface of the finished floor, thus projecting six inches into the concrete. Through the top of each pile, about eight inches from the end, is driven a three-quarter inch iron rod. Three-quarter inch round iron rods are imbedded in the floor and pass under the cross bars driven through the head of each pile, thus connecting the floor firmly with the piles. The maximum load on any one pile is fifteen tons, and this only under exceptional conditions; the average load through-out the foundations being about ten tons per pile. It was expected that difficulty would be encountered in making this floor water tight, particularly at the points where the floor joined the large masses of concrete in the foundations of the generating sets and the retaining walls around the borders of the lot. The heavy foundation and the retaining walls were put in before the floor. The bottom line of these foundations is on the same level as the botton of the floor and it was feared that cracks would develop at the juncture of the floor with these large masses; this, however, did not prove to be the case, owing to the care with which the floor was laid and the large number of piles used to sustain the heavy foundations. Some cracks developed in the floor after it was completed, but no particular difficulty was experienced in making these water-tight.

The building and foundations were put in for three units, the condenser pit being placed in the center of the property and made sufficiently large to accommodate the condenser and auxiliary machinery for six units. The building is frame with pressed brick walls on three sides and with a wooden frame wall covered with corrugated iron on the east side which can be readily removed when the other four units are introduced and the building enlarged to accommodate them. The foundations for the machinery throughout, the retaining walls up to the sidewalk line, and all the floors are of concrete, there being 50,000 cubic feet of concrete used for the portion of the plant now installed. The building is of a very substantial character, with steel frame, pressed brick walls and slate roof.

The equipment of the station consist at present of two generators of 1500 kilowatts capacity each, three boilers; and the necessary condensers and auxiliary machinery.

Before deciding on the type of boiler to be adopted in this station, careful consideration was given to the desirability of using superheated steam. Records of a number of tests made on engines using supeheated steam were examined, and without exception a marked gain in efficiency was recorded. Some anxiety was felt as to possible difficulties in lubrication, but the available information on the subject led to the belief that with a moderate degree of superheat, say from 100 to 150 degrees Fahrenheit, no difficulty would be experienced, whilst a material increase in efficiency would be assured. After giving the matter very careful attention, it was finally decided to install boilers fitted with superheaters capable of imparting to the steam superheat of from 100 to 125 degrees Fahrenheit.

The contract for the boilers was awarded to Babcock & Wilcox Co., and comprised three Babcock & Wilcox water tube boilers, each with a total heating surface of 6001 square feet, built for a working pressure of 160 pounds per square inch, and fitted with superheaters capable of superheating the steam from 100 to 120 degrees Fahrenheit, when the boiler is operated at or about its normal rated capacity. The boilers were erected bythe builders,and set two in one battery and one singly. The builders were required to guarantee that the boilers, when tested under rated load, should show an efficiency of 80 per cent., and that the superheaters should be capable of imparting to all the steam that the boilers could make a superheat of from 100 to 120 degrees Fahrenheit over and above the temperature of saturated steam at a presure of 160 pounds per square inch above the atmospheric pressure.

The fuel used in this plant is, of course, oil, a large supply being carried in two steel tanks buried below the sidewalk outside the building. The furnaces of the boilers were arranged on the Peabody system, in which the bridge wall is placed further away from the front of the boiler than is customary and the burner installed immediately in front of the bridge wall, throwing the flame forward over towards the fire front instead of the reverse direction as is usual in most oil burning installations.

The engines are horizontal, cross compound, condensing, Corliss engines, built by the Pennsylvania Iron Works Company, Philadelphia, Pa., having high pressure cylinders thirty-two-inch diameter, low pressure cylinders sixty-four-inch diameter, and a stroke of fifty-four inches, to run at a speed of ninety revolutions per minute. These engines are fitted with double ported Corliss valves, steam actuated dasphpots and the usual form of Corliss valve gear. They are fitted with pendulum governors driven by gearing and controlling the cutoff in both high and low pressure cylinders. The governors are provided with an electric synchronizing device capable of changing the speed of the engines five revolutions above or below normal speed, and so arranged as to be operated from the switchboard. These governors were guaranteed to so control the engines that successful parallel operations without "hunting", "racing," or "pumping" could be secured, it being a condition that the variation of angular velocity of the prime movers should not exceed between two generators operating in parallel a displacement of more than five electrical degrees.

The engines are of the heavy duty type with very large wearing surfaces, the main journals being twenty-two inches in diameter by forty-four inches long. The cylinders are lubricated by the forced feed system, separate lubricators being provided for the piston, each of the steam valves and the stuffing box. Metallic packing is used throughout. The main journals and other working parts are lubricated by oil supplied by a pump in the basement and returned through drip pans, filtered, and used over again, the consumption of lubricating oil being very small.

The weight of each of these engines, without the fly wheel is 33,500 pounds. The engines were guaranteed to develop one indicated horse-power for thirteen and one-half pounds of dry saturated steam per hour with a steam pressure at the throttle of 145 pounds per square inch and twenty six inches of vacuum at the low pressure cylinder when running ninety revolutions per minute. The generators, built by the Allis-Chamlers Co., are the engine fly-wheel type, 1500 kilowatts, capacity each, alternating current, eighty poles, sixty cycles, 2250 volts, two phase, ninety revolutions per minute. They are separately excited from belt-driven exciters, and have a guaranteed efficiency of not less

than 94 per cent at full load; they are guaranteed to withstand a 50 per cent. overload for one hour with a rise in temperature not to exceed 45 degrees centigrade. The rotor of each of these generators weighs 244,000 pounds. To provide current for a small number of direct current arc lights, three Fort Wayne direct-current arc light generators were installed, operated by two Westinghouse induction motors. For the 250-volt direct current power service one 300-kilowatt synchronous motor, direct current, generating set, running at 450 revolutions per minute, is installed in the station and one smaller set of 200 kilowatts capacity is installed at the sub-station at Second and Stevenson Streets. Practically all of the distribution is underground, very little overhead wiring being used.

For each engine there is one surface condenser of 4500 square feet of cooling surface, one steam driven Edward's patent air pump, with two steam cylinders seven inches in diameter, two air cylinders sixteen inches in diameter with a stroke of ten inches, one ten inch centrifugal circulating pump, steam driven, having a capacity of 3000 gallons per minute, directly coupled to a vertical high speed engine with steam cylinders ten inches in diameter by ten-inch stroke, making 350 revolutions a minute. The condensing apparatus was guaranteed to be capable of maintaining from twenty-six to twenty-seven inches of vacuum with circulating water of 55 degrees Fahrenheit when the main engines were using 40,000 pounds of steam per hour.

Careful consideration was given to the matter of electrically driven auxiliaries for this plant, but in view of the fact that only two units were to be installed, one of which would be in use, steam driven auxiliaries were compulsory. All the auxiliary engines exhaust into a large closed feed water heater which condenses all the exhaust steam. The feed water is pumped through this heater on its way to the boiler, and the resulting temperature of the feed water is usually 210 to 225 degrees Fahrenheit. The feed pumps are of the vertical "Admiralty" Pattern, and meters are fitted to measure the water supplied to the boilers. The air pumps discharge into a large hot well below the boiler room, from which the feed pumps take their supply. This hot well is fitted with filtering arrangements for the purpose of removing the entrained oil from the feed water.

In building this plant, contracts were let for the excavating, piling, foundations, steel work and building proper and for the erection of the boilers; the balance of the machinery was erected by the owners, who did all the piping and electrical work. The steam piping throughout is lap-welded steel pipe with heavy cast iron flanges secured to the pipe by "peaning;" all flanges were faced after having been secured to the pipe, and gaskets of corrugated copper are used throughout on all steam lines. It is worthy of note that there has not been a leaky joint in this plant to date.

The condensing water is pumped from the bay at the foot of Folsom street, the suction pipe entering the bay about 650 feet from the station. The suction pipe is twenty-eight inches in diameter, of heavy cast iron, and is sufficiently large to furnish condensing water for the station when completed.

There is fitted in the building an electrically operated travelling crane with a capacity of forty tons. This crane is sixty-five feet span and the lift of the main hook is twenty-four feet. It is operated by direct current motors with a voltage of 225.

The old plant of the Mutual Electric Company was situated on Howard steert and furnished single-phase current of 135 cycles to a number of consumers. The new plant, furnishing two-phase current of sixty cycles, was put into operation on March 22, 1905, and on April 22, 1905, the old plant was shut down, during that time motors of all consumers having been changed without interruption to service.

Since the new plant went into operation it has been run continuously without shut-downs; no trouble has been experienced with any part of the machinery. The plant has always shown a very high efficiency. Whilst no data is available as to its efficiency using saturated steam, there is no doubt that the use of superheated steam is effecting considerable saving in fuel. No difficulty has been experienced with the lubrication of the main or auxiliary engines. The regulation of the engines is very satisfactory and they operate together in parallel perfectly.

The work of building this plant was carried out by the engineer of the Mutual Electric Light Company under the direction of General Manager W. R. Summerhayes.

(Editorial Note—It is worthy of note that the power plant above described sustained only one injury from the earthquake and that of a minor character. The injury alluded to was the breakage of the 28-inch cast iron salt water main connecting with the bay. This main serves a suction pipe for the circulating pumps; it passes out though the basement of the building on the Folsom Street side under the sidewalk and runs down Folsom Street to the bay. It is buried four feet below the level of the street. The eatrhquake dislodged part of an ornamental brick wall extending above the roof of the building. This mass of brick work fell from a height of about forty feet striking the sidewalk just over the pipe, breaking the pipe in two places about twelve feet apart and driving the broken section down bodily into the ground two inches. A trench was dug to uncover the pipe and the breaks were found to be long and irregular. As it was impossible to get new pipe cast within reasonable time temporary repair was made by jacking the pipe up into place and building around each break a box five feet square by five feet long. The boxes were filled with cement mortar made of two parts of sand and one part of Portland Cement. After allowing a reasonable time for the cement to set the pumps were started. They at once picked up the water and the whole plant was put in operation on Monday May 1st and has been running continously since, supplying light and power to the district.

The writer of the above article, Mr. J. H. Hopp, is Consulting Engineer to the Mutual Electric Light Co. and the plant was designed and built under his supervision.)

The State Board of Architecture will meet at frequent intervals at its temporary headquarters, No. 1343 McAllister St., for the purpose of issuing certificates to qualified and competent architects for the purpose of enabling them to practice architecture in the State of California, in conformity with the law regulating the practice of architecture in this State.

Market-street property in a good location at the present time is worth $5 per front foot per month. This is the price at which land-owners are instructing real estate agents to sign leases. These leases are only for periods ranging from six months to two years. In every instance the tenant has to erect his own temporary building.

President Calhoun of the United Railroads says that he has secured fifty of the fine modern electric cars of the Chicago City Railway and that they will be shipped here immediately. He has also ordered 100 now cars built in the East, which will arrive in about five months. He also placed an order for $700,000 worth of material, including rails, machinery and overhead work. Ten million dollars will be spent on improvements.

The Steam Turbine As Adapted for Marine Use.

BY NORRIS K. DAVIS.

In order to clearly consider the adaptability of the steam turbine for marine use, the leading characteristics of the modern commercial turbines and the principal requirements to be met by the prime mover of a steam vessel should be briefly examined.

As the name implies, the steam turbine is a machine for converting the potential energy possessed by the steam, due to its pressure, directly into useful work which can be taken from a rotating shaft. The method of securing this result in different turbines leads to a general classification of the same into action and reaction turbines, of which the former will be considered first.

All action turbines operate by converting the potential energy due to pressure of the steam into kinetic energy due to velocity, and absorbing this velocity by means of blades or vanes set into the periphery of a rotating wheel or set of wheels. The entire change from potential to kinetic energy may all take place at once and be absorbed on one wheel, several wheels, or may be performed by steps or stages and several wheels. It is customary to group this class of turbines according to the method of making the change from potential to kinetic energy and absorbing the velocity of the steam thereby created. There are, therefore, on the market turbines of this class constructed as follows:

1. Complete expansion between the available limits of pressure in one set of nozzles so directed at a set of vanes on one wheel that the valocity of the steam is entirely checked in the direction of rotation of the wheel, and its energy thereby transferred to the wheel.

2. Complete expansion in one set of nozzles, as before, but the nozzles so directed and the wheel vanes so constructed that the velocity in the direction of rotation is only partially checked by the wheel and the steam can be properly guided by stationary guide vanes onto a second wheel where more of the velocity in the direction of rotation can be checked, and so on until the same is entirely removed. It is obvious that all the wheels will rotate in the exhaust pressure and that the speed of rotation will be reduced (that of Case 1) for the same power and diameter, but that the turbine will be longer and heavier.

3. Partial expansion of the steam in one set of nozzles acting on one wheel, the exhaust from this wheel passing through another set of nozzles wherein it is further expanded and acts on a second wheel, and so on by repeating partial expansions to the limit of pressure.

4. A combination of cases 2 and 3.

The reaction turbine, which is the type up to the present time most generally adapted for marine work, dispenses with the simple expansion nozzle altogether and consists of alternate rings of stationary guide vanes and rotating vanes. The expansion of the steam is partially accomplished in the guide vanes, and completed during the passage of the steam through the moveable vanes. The result is, therefore, a gradual expansion from admission to exhaust in guide and moveable vanes, and an action on the moveable vanes due both to velocity and pressure. It is plain that both in this case and Cases 3 and 4 of the action type, provision must be made for the increasing volume of the steam as expansion progresses,

Inherently the steam turbine in its simplicity is more economical than the steam engine, inasmuch as the steam always flows in one direction, and there is therefore no alternate heating and cooling of cylinder walls at the expense of the working steam, a higher vacuum can be carried for the same reason, the parts are fewer and lighter, and there are no heavy reciprocating weights, but the velocity of steam issuing from an expansion nozzle operating between the limits of pressure which are considered good practice is excessively high.

The peripheral speed of a single wheel for maximum practical economy should be nearly one-half of the velocity of discharge, and therefore the revolutions per minute of a single wheel of reasonable diameter and intended to absorb all the energy is entirely too high for almost every practical purpose. Hence, in order to reduce the speed of the gearing shaft gearing must be adopted or the number of rotating wheels increased, each one absorbing a portion of the available energy or velocity. Gearing is hardly suitable for marine work, and it is evident that as the number of wheels are increased the steam has to travel farther, and both the fluid and mechanical friction will increase. There is therefore a limit to which this multiplication of wheels can be economically carried.

Considering the mechanical construction of the turbine and the theory of its operatioe, it is evident that under conditions requiring a constant high speed always in the same direction the turbine will give excellent economical results, and repeated careful tests would seem to show that these results are better than those secured from the best steam engines under the same circumstances. The particular class of work filling the above conditions is direct connection to such high speed machinery as centrifugal pumps, ventilating fans, electrical generators, etc.

For marine work direct connection to the screw is necessary, also the ability to reverse and manoeuver, as well as a reasonable economical range of speed in certain cases.

Without going into the theory of the screw propeller, it is sufficient to say that the lowest economical speed of the steam turbine at which it produces better results than the steam engine is too high for the helicoidal propeller, and, therefore, some sacrifice of the inherent turbine economy is necessary. There are only two ways in which a slower turbine speed of rotation can be secured, namely, by increasing the diameter of the turbine wheels, the peripheral speed remaining con-

stant, or by increasing the number of turbine wheels and reducing the peripheral speed. The first method very shortly reaches a limit on account of the breadth of the vessel, and the latter method would make the turbine too long. The turbine is therefore divided into a high pressure section operating a central shaft and screws, and two low pressure sections, each receiving one-half the exhaust from the high and each operating wing shafts and screws. Even under these conditions the speed is still high, and sometimes two and three screws, whose diameter is greater than their pitch, are mounted on the same shaft in order to prevent excessive peripheral screw speed and the difficulties attendant thereto, at the same time securing sufficient aggregate area of screw. It cannot be directly shown that such an arrangement results in an economy, but the fact remains that experience has shown it does under favorable circumstances.

Other arrangements have and are being tried, such as a single turbine on one shaft and two separate turbines on twin shafts, the same as a twin screw reciprocating engine equipment, but three shafts seem at least for the present to be the general practice.

Various ideas for backing or reversing a turbine have been tried, but no successful method has yet been devised. It is therefore necessary to use either a separate engine, turbine, or an auxiliary reversing turbine in the exhaust chamber of the main turbines. The separate engine is hardly practicable, the separate turbine increases the length of the engine room beyond practical limits, and the reversing turbine in the exhaust chambers of the main turbines is of necessity much smaller than the main turbines and therefore has not the power. The latter arrangement is the one commonly adopted, however, and has the advantage of occupying the least space and of being no particular drag when running ahead, as it revolves in the vacuum of the exhaust chamber.

In general, for manoeuvering, turbine driven vessels are not very handy. Two shaft vessels can be manoeuvered going ahead the same as a twin screw ship, and three-shaft vessels by shutting off the steam from the high pressure turbine and admitting live steam to the two-wing low pressure turbines. The resistance of the turbine to rotation is very slight, and therefore after the steam is shut off the drag of the screw continues to rotate the turbine wheels, decreasing the resistance to stopping, and making it difficult as well as dangerous to reverse suddenly. In general, turbine driven vessels present serious difficulties in the way of manoeuvering, stopping, starting and backing with ease. These are serious objections for vessels of war.

On account of the high speed of the turbine necessary for economy of size and steam there is very evidently a relation between the speed of the ship, size of the ship, and the economy of installing a steam turbine. This can be briefly stated as follows: that for every size vessel there is a speed below which a positive loss would be entailed by installing a steam turbine as motive power, because the size of the screw propeller bears a certain relation to the immersed midship section, and is more or less independent of the speed of the vessel, the revolutions of the propeller determining the speed. Hence, for two vessels on the same displacement and form, the screws would be approximately the same size, but the turbine for the vessel of less power and speed would be larger than the turbine for the other, since the size of the turbine depends upon the speed of rotation for a given boiler pressure and vacuum, and not upon the power.

It would seem, therefore, that the steam turbine as at present manufactured is suitable only for vessels intended to be driven at a constant relative high speed for the size of the ship and on a run where there is little manoeuvering or backing to be done. Fast passenger or mail service on a relatively long run would seem to be the field, as these vessels make a high rate of speed and rarely change the revolutions from the designed number per minute, thus fulfilling the conditions under which the turbine can work more economically than a steam engine, and minimizing the disadvantages arising from poor manoeuvering and reversing facilities, as well as great loss of economy due to operating the turbine at reduced speeds. All war vessels are designed for an economical cruising speed much less than the maximum speed, which feature does not lend itself to turbine work, as the turbine is essentially a constant speed machine and any variation from the designed speed of rotation results in a much more marked decrease of economy than in a steam engine. A turbine must be designed for and will show the best economy at the greatest speed, and any reduction from this speed will result in a great reduction of efficiency on account of the impossibility of designing the shape of the vanes for more than one speed. It has been suggested that war vessels should be equipped with reciprocating engines for cruising and turbines for the maximum speed, each prime mover being designed for maximum efficiency under its condition of operation. There is no doubt but what such an arrangement would make an economical plant, but the difficulties of manoeuvring would arise at a time when the greatest ease of handling the ship was most to be desired.

There are some other features of turbine practice which are worthy of notice and bear more particularly on the steam plant of the vessel. Experience has shown that the turbine equipment for a vessel costs and weighs about the same as a reciprocating engine outfit, occupying as much if not more floor space. This is on account of the increased size of the condensing machinery usually installed to secure the benefit of a high vacuum. However, turbine machinery does not take nearly as much head room, and there is therefore a saving of space on the upper decks. There is also practically no vibration in a turbine, which would make the passenger steamer somewhat more comfortable, and a slightly steadier gun platform for the war vessel. On account of the few number and simplicity of parts there can be a reduction of the engine room force and also of oil used, and as no oil is used in the turbine cases the exhaust steam is pure, the condenser and boilers are therefore always clean, thus reducing labor and increasing the average plant efficiency.

The question of the use of the steam turbine for marine purposes or for any other purpose in the future can hardly be considered at the present time. Theoretically the turbine is the nearest, most economical and most sensible way of using steam for making power, but it must be admitted that there are other serious considerations which greatly limit the field of its usefulness at present. On the other hand these considerations are purely mechanical and the objections can be eliminated if the proper mechanical devices can be invented. The turbine has not been in commercial use much over fifteen years and can hardly be expected to be in the same state of mechanical perfection as the reciprocating engine, which is over a century old.

General Greeley, finding that the present pumping plant at the mouth of Lobos Creek, which supplies the Presidio with water, now furnishing 400,000 gallons a day, was insufficient for the thousands of campers, has ordered an extension which will double the present capacity.

Book Review.

Sibley Journal—THE JOURNAL is in receipt of the March number of the "Sibley Journal of Engineering," Cornell University, which is a credit to that institution. It contains several sketches, and the most interesting paper is on Bancroft Gherardi, who was born in this city in 1873. Mr. Gherardi has made a great name for himself in the world of electric engineering. He received the degree of Master of Electrical Engineering from Cornell, and after getting his degree he went into the telephone business and entered the employ of J. J. Carty, chief engineer of the New York and the New Jersey Telephone Companies, which had consolidated.

The Illuminating Engineer—The Illuminating Publishing Company, of New York, has issued a most interesting booklet entitled "The Illuminating Engineer." The frontispiece is especially good, showing a picture of the lights that were used in the 16th century. This book is, indeed, interesting to the person who has little or nothing to do with the business of illuminants as well as to the person who makes his living by supplying an illuminant. In other words anybody, by glancing through the pamphlet, can arrive at a good understanding of the work that has been done in recent years to illuminate our streets, our homes and our public places. The book is well worth a careful study.

DISTRIBUTION OF POWER AT NIAGARA FALLS.

The International Waterways Commission has made a report to the Secretary of War on the preservation of Niagara Falls, and this report has been transmitted to Congress. Some practical suggestions are made as follows: "The Secretary of War be authorized to grant permit for the diversion of 28 500 cu. ft. per second, and no more, from the waters naturally tributary to Niagara Falls, distributed as follows: Niagara Falls Hydraulic Power & Manufacturing Company, 9,500; Niagara Falls Power Company, 8,600; Erie Canal or its tenants (in addition to lock service), 400; Chicago Drainage Canal, 10,000.

"All other diversion of water which is naturally tributary to Niagara Falls to be prohibited, except such as may be required for domestic use and for the service of locks in navigation canals. Suitable penalties for violation of the law to be prescribed.

"The foregoing prohibition to remain in force two years, and then to become the permanent law of the land, of in the meantime the Canadian Government should have enacted legislation prohibiting the diversion of water which is naturally tributary to Niagara Falls in excess of 36,000 cu. ft. per second, not including the amount required for domestic use or for the service of locks in navigation canals. It is assumed, however, that an understanding upon the subject should be reached by treaty. The object of such legislation would be to put a stop to the further depletion of the falls and at the same time inflict the least possible injury upon the important interests now dependent upon this water power.

"The amount to be diverted on the Canadian side has been fixed with a view to allowing to the companies on that side the amounts for which they now have work under construction, which are: The Canadian Niagara Power Company, 9,500; Ontario Power Company, 12,000; Electrical Development Company, 11,200; Niagara Falls Park Railway Company, 1,500; Welland Canal or its tenants (in addition to lock service), 1,800."

The report states that the amount of flow thus far diverted on the American side has been only 27,800 cu. ft.

STEAM TURBINE IN SIAM.

One of the most progressive of the independent principalities of Asia is the little kingdom of Siam, on the Indo-Chinese Peninsula. In the principal city, Bankok, is a modern electric railway power plant, operated by the Siam Electricity Company and equipped with reciprocating engines and generators. Because of the increased demand for power an additional unit has become necessary, and a Curtis steam turbine has been decided upon as most suitable. This is a 500 killowatt 575-volt machine, built by the General Electric Company, of New York. The boiler plant for this station is unique in that paddy husks are burned in place of coal. The fuel is brought down from the river from the rice fields in flat bottomed boats to the power house and unloaded directly into the boiler room by an elevator and belt conveyor, built by the Link Belt Engineering Company, and operated by several direct current 500-volt General Electric Company's motors of the CE type. This mehod of using rice husks for fuel is an economic utilization of a waste product similar to the use of the crushed sugar cane, or bagasse, on our plantations.

A steel plant costing $5,000,000 and to give employment to 5000 men will be built at Tacoma by Alfred H. Merritt, of Duluth, Minn., and J. Will Smith of Los Angeles.

COMMON DEFECTS IN INSIDE WIRING.

The subjoined lists of electrical defects found to generally exist in the equipment of the various towns and cities in the west, by the underwriter's electrial bureau, should prove of interest to contractors and other electricians, in that close perusal of same may tend to improve installations, leaving little for inspectors to criticise, and thus lessen the labor of overhauling improper work.

Service wires not properly installed and insulated.

Wires undersized.

Circuit or line wires overloaded.

Wires not properly bushed through floors, walls or partitions, and at outlets.

Wires not protected from mechanical injury.

Wires not properly installed in elevator shafts.

Wires do not have sufficient support.

Wires supported by wood cleats staples, etc.

Wires do not have approved insulated covering.

Wires crossed or are in contact with gas or water pipe, or conducting material.

Lamp cord used in show windows, to support clusters and for circuit wires.

Use of unapproved lamp cord.

Lamp cord subjceted to moisture or corrosive vapors.

Pendant wires not supported independently of line wires.

Joints and splices not properly soldered and taped.

No service cutout.

Cutouts not properly protected against mechanical injury.

Change in size of wires without fusible protection.

Use of canopy cutouts in fixtures.

Cutout cabinet unlined.

No service switch.

Knife switches not properly installed.

Flush switches not provided with iron or steel boxes.

Snap switches not provided with a sub-base.

Fixtures wired with unapproved wire.

No insulating joints or combination fixtures.

Incandescent lamps too near inflammable materials.

Use of metal sockets in damp places.

Sockets not properly protected from inflammable gases.

Sockets not provided with bushings.

Wooden, broken or unapproved rosettes.

Use of fused rosettes in places containing dust or gases.

The Journal of Electricity Power and Gas

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EDITORIAL.

The Outlook.

As in all great crises, where disaster has overtaken a city or nation, there are the two extremes of opinion. The one is a reflex of the sack cloth and ashes—the other a soaring in the clouds above earthly influences. The mean between these two, the judgment which calmly faces the conditions and obstacles and weighs carefully the golden promises for the future, is probably the more sane and worthy of consideration. San Francisco faced a condition which was at first appalling and alarming. The work of years had been swept away, the working forces in a needy and demoralized condition, the means of communication by rail and wire were destroyed and the records of past business and present negotiations largely consumed. To emerge from these most depressing influences into a state of tranquillity and forceful upbuilding has shown the stamina of our people and their inherent ability and resourcefulness under the most trying circumstances.

Rising like Phoenix from her ashes, San Francisco lost no time in proving that she is still alive and not afraid to make a new fight for existence and her old time supremacy. Ably backed by civic and military authorities, every hour has shown real progress. The City of three weeks ago was a pitiable ruin—the town of today is bustling with energy, and enjoying a partial restoration of railway, telegraph, postal, light and telephone service.

There exists a friendly rivalry in re-establishing business at the earliest possible moment and the marked characteristic is that of a sanguine forecast of increased future trade. This seems to be justified in a measure, by the conditions. Whether a man does business on a barrel head or a roller top desk—in a one story shack or a ten story structure need not necessarily affect the volume of trade handled. These are more or less matters affecting his own personal comfort. The main point is the demand and the facilities for ordering, forwarding and delivering the goods from the sources of supply.

A whole city to be rebuilt means an unusual demand for goods and materials of every kind. The necessary capital for rebuilding is already assured so that the rapid progress of the work is possible. The old time difficulty of slow shipments from Eastern factories is removed, for the universal instructions are to rush goods to the Coast and to give preference to San Francisco orders. The Railroads, too, agree to give San Francisco freight the right-of-way, so that orders can be taken with more confidence than ever before that they can be filled within a reasonable time. Then, too, the restoration of means of travel and communication facilitates the rapid transaction of business. The Post Office is moving along with its old time regularity; the telegraph is in shape to handle all messages; the street railroads are running on all electric lines (18 in number); the power has been turned on at the electric light plants so that business houses are now supplied with current and also dwellings will be after inspection; the gas generating plants being uninjured will resume now that the mains have been repaired; the water supply, it is asserted, is equal to all needs; and the telephone service has been re-established in the down town Ferry district and will shortly be in working order in the unburned section. These favorable conditions make the transaction of business possible and, outside of the many inconveniences natural to the present situation, there is no reason why every business house should not resume right here in San Francisco instead of working at long range across the Bay. With part of the business houses now located in Oakland and others in the Western Addition, besides a scattering in Berkeley, Alameda, Richmond, etc., business intercourse is difficult. This drawback will be removed, however, as the various houses return to their old locations.

The Journal, therefore, feels that it can, with conservatism, report a gratifying condition at the present time in all the interests it represents, and to forecast a steady and permanent up-building along lines which insure business security.

NOTICE

To Structural Engineers

It has been suggested that a meeting of engineers whose occupation, education or practical experience qualify them to intelligently observe and analyze the structural effects produced in Class "A" buildings by the recent earthquake and fire in San Francisco, would offer an opportunity for exchange of data and would tend to a concert of opinion as to future practice.

It is intended that this invitation should extend to all engineers who are engaged in the design, fabrication or erection of any structural materials of a permanent or fire resisting character, such as steel, terra cotta or reinforced concrete, and should include engineers employed as experts in fire-proofing by insurance companies, as well as testing experts.

All engineers who desire to attend such a meeting are requested to forward their names and addresses to Lewis A. Hicks at Berkeley, Cal., or Fairmount Hotel, San Francisco, before May 15, 1906. Announcement will be made later as to time and place for holding the first meeting.

John D. Galloway, Consulting Engineer.
C. H. Snyder, of Milliken Bros., Contractors.
Lewis A. Hicks, of Lindgren-Hicks Company, Contractors.
Loren E. Hunt, Testing Engineer U. C.
John B. Leonard, Consulting Engineer
Frederic S. Edinger, C. E. Loss Company.
Mr. Hoyt, of Long & Hoyt.
Chas. Derleth Jr., Prof. Structural Engr., U. C.

PERSONAL.

Messrs. A. M. Hunt, George L. Dillman, Wynn Meredith and W. H. Allen, all well known engineers of this city, have joined forces and will carry on a general engineering practice. They will have temporary offices in a building being erected at the corner of California and Front streets. We predict a large measure of success for the new firm of Hunt, Dillman, Meredith & Allen, who form a combination of men possessing exceptional talent and wide and varied technical and business experience.

General Eugene Griffin, first vice-president of the General Electric Company, sailed from New York on April 10th on the steamer "Graf Waldesee." General Griffin plans an extended trip in England and on the Continent, largely for rest and recreation. As he is a director in the Cie Francaise Thomson-Houston and vice-chairman of the British Thomson-Houston Company, these interests will naturally claim a portion of his time.

Wakefield Baker, of the wholesale hardware firm of Baker & Hamilton, whose establishment was destroyed by by the fire, left for the East on Saturday to purchase a $300,000 stock of goods. Mr. Baker has received word from the Eastern manufactories from which his firm has been buying for years that they are willing to do everything possible to help the firm and they have requested him to come to see them in order to expedite matters. Though suffering a great financial loss, Mr. Baker and his associates have unbounded faith in the future of San Francisco, and will do their share towards rehabilitating the business prestige of the city.

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Home and Foreign News.

RE-INFORCED CONCRETE POLES.

Mr. J. L. Weller, superintending engineer of the Welland canal, says the Canadian Electrical News, has conceived the idea of a reinforced concrete pole to take the place of cedar and steel. The idea seemed to preposterous, however, that it was over two years after its first conception that the first pole was made. This was a failure on acount of faulty reinforcement, and it was not until the third or fourth trial that a substantial pole was made, nearly two years ago. This pole when tested was so satisfactory that others were immediately built, and today there are nearly one hundred poles erected on the Welland canal electrical transmission line. All the cedar poles for the line and two hundred steel poles thirty-five feet in height had already been contracted for at that time, consequently the concrete poles were used only in positions such as railway or road crossings where an extra high pole was required.

The poles are manufactured on the ground with their butts immediately over the hole in which they are to be erected, as it has been found very expensive to transport them on account of their great weight; thirty-five-foot pole for ordinary line work weighing about two and one-half tons, and a fifty-foot one about five tons.

Most of the poles so far made have been calculated to stand a horizontal pull at the top of 2,000 pounds, and tests that have been made show that the calculations have been correct, all standing the full load without any impairment, except one which failed at 2,025 pounds, the cause being a flaw in the weld of one of the steel rods.

Concrete poles are quite elastic, and they do not require painting, being of a pleasing gray color, which, of course, will last indefinitely. They should last forever, as the weather is claimed to have no effect whatever on them. As there is some question about this later assertion, attention may be drawn to a good granolithic sidewalk, which, if properly built shows no signs whatever of age after 25 years, and a sidewalk during the spring, fall and winter is under much more serious stress of weather than a pole could possibly be.

Arrangements are now being concluded for the building and erection of two poles 150 feet in height at St. Catharines to carry wires over the old Welland canal for the Lincoln Electric Light and Power Company.

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GENERAL WRECKING A SPECIALTY

A Temporary Office of HEALD'S BUSINESS COLLEGE and of HEALD'S SCHOOL OF MINES AND ENGINEERING has been opened at 1451 Franklin Street, S. F. Both schools will be reopened as soon as suitable quarters can be obtained.

Professional Cards.

Cory, Meredith & Allen, engineers, Contra Costa Water Company Building, Ninth and Washington Streets, Oakland.

Donald C. Jackson, C. E., and William B. Jackson, M. E., electrical, mechanical and civil engineers, Madison, Wis.

H. M. Byllesby & Co. (Inc.), design, construct and operate railway, light, power and hydraulic plants, 171 La Salle St., Chicago.

Edward F. Cannon & Co., electric and hydraulic engineers, 309 McKay Bldg., Portland, Or.

Leon M. Hall, consulting engineer, 814 Hayward Building, San Francisco.

R. S. Masson, consulting engineer, 709 Pacific Electric Building, Los Angeles.

W. Stuart Smith, consulting engineer, 2538 Dwight Way, Berkeley, Cal.

H. C. Thaxter, electrical and mechanical engineer, Atlas Building, 604 Mission Street, San Francisco.

C. F. Wakefield, surveyor and engineer, room 22, Porter Bldg., San Jose, Cal.

Van der Nailen's School of Practical Engineering, Telegraph Ave. and 51st Street, Oakland.

Clem A. Copeland, M. E., consulting and supervising electrical and mechanical engineer, Bradbury Building, Los Angeles, Cal.

Robert McF. Doble, consulting and supervising engineer, San Francisco, Cal., Colorado Springs, Colo.

Mutual Gas and Engineering Company, consulting engineers and builders of gas plants, San Francisco, Cal.

Smith, Emery & Co., chemists and chemical engineers, 1104 Broadway, Oakland.

Rudolph W. Van Norden, consulting engineer, San Francisco, Cal.

H. J. Neall, consulting electrical engineer, 12 Pearl Street, Boston.

NOTICE

To Architects, Builders, Engineers and Others Interested in the Building Laws of San Francisco.

Headquarters Committee on Building Laws, Mowrey's Hall, Laguna and Grove Streets, San Francisco, May 8, 1906.

PUBLIC NOTICE is hereby given that it is the intention of the Committee on Building Laws, appointed by his honor, Mayor E. E. Schmitz, to recommend to the Board of Supervisors for adoption a revision of the building laws and ordinances of the city and county of San Francisco.

In pursuance of this policy, and to aid the committee in its work, architects, builders, engineers and all others interested in the matter under consideration are hereby invited to submit, in writing, within ten (10) days hereof, such suggestions, recommendations, changes and amendments to the laws and ordinances regulating the construction of buildings in San Francisco as their knowledge and experience may deem advisable in prescribing the conditions under which all permanent structures shall be erected in the city and county.

Copies of the present building laws and ordinances may be obtained upon application at the headquarters of the Committee, as above noted.

JAMES D. GALLAGHER, Chairman.
DANIEL G. COLEMAN, Secretary.

THE INTERNATIONAL ENGINEERING CONVENTION.

The Institution of Electrical Engineers, London, has arranged a most important reunion of electrical engineers for the coming summer. A cordial invitation to visit this country has been accepted by the chief electrical associations of Canada, France, Germany, Italy, Switzerland and the United States and the members of each society electing to take the trip are timed to reach London June 3d and 4th next. The meeting should be a highly successful one considering the extent and character of the programme arranged for the delectation of the visitors. It includes four days in London, and a provincial tour including Birmingham, Manchester, Liverpool, the Lake District (for a week end) Glasgow, Edinburgh, Newcastle, and Leeds, and between start and return the best that the country can show in the way of engineering and electrical works will be inspected. The institution is to be congratulated on the representative character of the route selected, and we are sure its efforts will be well suported by British electrical engineers in extending the heartiest possible welcome to their friends from abroad.

ELECTRICAL EXHIBITS AT CINCINNATI FALL FESTIVAL.

An important feature of the Cincinnati (Ohio) Fall Festival, to be held from August 8 to September, 22, 1906, will be the electrical exposition, in which will be displayed the newest achievements in all branches of electrical industry. The main object of the exposition is to familiarize the general public with the many ways in which electricity and electrical apparatus and appliances can be utilized in everyday life. It is the intention to make the display so thorough and so complete that nothing will be overlooked that will make it of very great interest, not only to the electrrical worker, but to the layman. A number of men well known to the electrical fraternity are interested in the electrical exposition and are taking a prominent part in the preparations which are now going on. Among these are J. C. Hobart, Triumph Electric Company; J. A. Brett, Westinghouse Electric and Manufacturing Company; Luke G. Lilley, of the Devere Electric Company, and Frank D. Lawrence of the F. D. Lawrence Electric Company. Mr. Lawrence is chairman of the committtee in charge of the electrical exhibits.

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STEAM TURBINE INVESTIGATION.

Mr. W. E. Moore of Connellsville Pa. has been added to the committee for the investigation of the steam turbine which is to report at the Atlantic City meeting of the National Electric Light Association. In order to complete the data for this report the committee met on Tuesday April 3rd at the office of Mr. Irving E. Moultrop in Boston. Mr. Moultrop has just returned from Europe where he went for the purpose of gathering data regarding turbine operation abroad. From Boston the commitee will visit the General Electric works at Lynn, Mass. and the Providence Engineering works Providence, R. I. It will then proceed to Schenectady for a day at the General Electric works; will visit Utica, Chicago and Millwaukee and on the return trip will visit the works of the Westinghouse company at Pittsburg. The report is expected to contain much interesting matter not heretofore published.

INTELLIGENT USE OF ELECTRICITY.

Mr. E. R. Weeks, past president of the National Electric Light Association, at the rceent annual meeting of the Manufacturers' and Merchants' Association of Kansas City, delivered an interesting address on applied electricity. He criticised the uneconomic work done on and by many plants, and said: "Ignorance of good practice in electrical engineering is equally expensive to the merchant. Since he usually has no knowledge by which to determine the kind of machinery best suited to his needs or the proper cost of its operation, he, too, is at the mercy of the unscrupulous vendors of current and apparatus. A certain hydraulic elevator in this city is now costing $3.49 per car mile while an electric elevator in the next block with one third more load costs by meter only 36 cents per car mile. On the other hand a new pair of lifts operated by electricty at 4 cents per kw-hour by meter, was recently costing $350 per month, while another pair of purely mechanical lifts doing much more work were costing only $142 per month. After thorough test and reconstruction the cost of running a pair of electrics dropped to $65 for last month, although the service had increased 10 per cent."

As to the beauty and value of electrical products, and the fine skill needed in their manufacture, he remarked: "As manufacturers and vendors of industrial products, it will interest you to hear that in the electrical arts is now found the most costly pound of manufactured product. It has been supposed that a pound of hair springs has the greatest pecuniary weight; being at wholesale rates, $42,000. I feel sure that those among you who have paid this price will be suprised at the statement of fact that the wholesale cash value of one pound of carbon filaments for incandescent lamps is $60,000, or 199 times its weight in gold. Some of you who are accustomed to buy and sell by the car load may think that the purchase of one pound of a commodity should be called a retail transaction; but when I state that 42,000 hair springs or 30,000,000 filaments are required to balance a pound of butter, I think you will all agree that even as small a weight as an ounce of either would constitute a wholesale consignment."

AUTOMOBILE FIRE ENGINES.

Automobile fire engines are being tested on an extensive scale in several German cities, and at Hanover the announcement is made that the annual cost of maintaining such an engine is only $500 as compared with the $3000 required to maintain a fire engine drawn by two horses. The saving is not altogether in horse feed, for the automobile also requires "something regular for his innards." The difference was brought about chiefly by the discharge of the men employed to tend the horses, and by the saving of the rent hitherto paid for stables. On the all-important point of efficiency, German experience goes to prove that an automobile fire engine can leave the station more quickly and reach its destination in less time than the older type of engine. On the strength of the reports from important provincial cities, Berlin, the capital, is also now adopting the innovation.

CARNEGIE TECHNICAL SCHOOL

It is announced that Mr. Andrew Carnegie has given $2,000,000 in addition to previous gifts for the maintenance of the Carnegie Technical Schools. Mr. Carnegie has already given more than $1,000,000. None of the latest gift is to be used for the erection of buildings. It is also announced that Mr. Carnegie expressed a desire that the Margaret Morrison Carnegie School for Women be completed as soon as possible, and assured the committee that he would meet the expense. It is expected the technical schools will have cost about $5,000,000 when completed.

NOVEL SUGGESTION FROM BERKELEY.

Ex-Secretary of the Treasury Charles Stebbins Fairchild, informed the Berkeley College Commerce Club today, in an informal address, that the only action he could suggest to stop the concentration of power in the hands of a limited number of financiers is to stop the use of steam and electricity.

"In my opinion'," said Mr. Fairchild, who was in Cleverland's first Cabinet, and who is a banker of renown, "the so-called concentration of power in the industrial and financial world today is due almost entirely to the improvements in transportation methods. The foundation of these improvements is the use of electricity and steam. If we want to do away with concentration, then I am afraid we will have to dispense with electricity and steam."

The Town of Palo Alto, Cal., will receive bids for Power Plant Machinery on June 4, 1906.

Specifications may be obtained from JOHN D. BOYD, Town Clerk, Palo Alto.

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SAN FRANCISCO

Industrial.

PRODUCER GAS POWER PLANT.

Producer gas power has recently been adopted by the Norton Emery Wheel Company for extending their present steam plant at Worcester, Mass. The horizontal double acting heavy duty type gas engine built by The Westinghouse Machine Company, of Pittsburg, has been adopted with the Loomis-Pettibone producers using bituminous coal.

The new gas engine will be 500 B. H. P. rated capacity, direct connected to a Westinghouse 250 volt 300 K. W. generator running at a sped of 150 revolutions per minute. This unit will operate in parallel with two belted steam units, the entire plant supplying current to the various motor drives in the factory, and also for lighting.

The Westinghouse engine will be of the tandem cylinder single crank style; water jacketed throughout. Pistons will be supported practically clear from the cylinder by front, middle and rear crossheads. All valves are located directly in the cylinder body in a vertical line; inlet at the top and exhaust at the botom. A sensitive governing system of the relay type places each inlet valve independently under the direct control of the governor, by which arrangement extremely close speed regulation is secured. Similar engines of this type are now operating the Warren and Jamestown Railway Interurban system at Warren, Pa., at the Carnegie Technical Schools, Pitsburg, Pa., at the Standard Steel Car Co., Butler, Pa., and at the Carnegie Steel Works, Pittsburg. Engines of 3500 H. P. are now under construction for the latter plant, designed to use blast furnace gas.

At the Norton Company's plant the gas used will be a mixture of the two gases averaging about 125 B. T. U. per cu. ft. The producer process is intermittent, water gas being made during a short run and "blast" or "air" being made while the producers are being blown preparatory to the succeeding water gas run. After a thorough cleansing in wet and dry scrubbers, the gas is sent to a holder of sufficient capacity to secure a thorough mixture of the alternating charges of the two different gases. In this case a 20,000 cu. ft. holder will be used —sufficient to run the engine for about 25 minutes.

THE WEBER SOCKET.

The Holabird-Reynolds companies are Pacific Coast distributors of a socket which is comparativley new to Pacific Coast trade. This is known as the Weber Key Socket, and is manufactered by the Weber Electric Company of Schenectady, N. Y. The socket has the approval of the National Board of Fire Underwriters and is on the "Approved List of Fittings".

It is substantial and simple in construction, can be wired in a fraction of the time necessary to wire any other, has longer life than any other, has longer positive current breaking distance than any other The lamp is securely held under tension by a flexible spring center contact.

No screws or rivets are used to hold shell and cap together. The shell is locked securely to the cap and cannot become loose, but can be easily removed and as easily replaced without the use of a screw driver or other tool. There is no liability of the shell becoming loose and dropping down on the lamp, which is a trouble common to other sockets.

To remove shell from the cap, press with the thumb of the right hand just below the projection nearest the key, and separate shell in cap with a hinge motion. To fasten shell to cap, after wiring, place the oblong projection in the shell in line with the guide slot in the cap and simply press the two together in a telescopic manner. The time and annoyance saved in wiring are apparent.

This socket is patented and the patents are protected by the Patent Title and Guarantee Company, of New York. The manufacturers guarantee protection to tehir customers on this score.

MODERN SHIPYARDS.

The Allis-Chalmers Company in its bulletin No. 1039 call attention to the use of electrical apparatus in shipyards on the Atlantic Coast and it seems strange that this apparatus has not been put into operation in the shipyards on this Coast. According to this bulletin expenses are reduced by the introduction of electricity. In the Fire River Ship and Engine Company which is looked upon as one of the best equipped shipyards in the country, the power house is centrally located.

The apparatus of the power house is of the simplest construction as only one variety of current is generated for all classes of service. In the same power-house building is the fine air compressing plant needed to supply the large number of pneumatic tools such as hammers, drills, caulkers, etc., used in ship work.

SPECIFY
"O K"
Weatherproof Wire

When placing your orders

"O K" Weatherproof Wire has been the **standard** of weatherproof insulation for the past twenty years. There is none "just as good." It is in a class by itself.

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We are prepared to build water water wheels for all heads of water and power
KNIGHT'S WATER WHEELS
From 2 to 6 feet in diameter and from 10 to 1000 horsepower. Wheels inclosed in iron cases from 6 to 24 inches
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Can make quick shipments from stock of
Machine Tools, Steam Plant Equipment, Gas Engines. Marine and Stationary Air Compressors, Rock Drills, Pneumatic Machinery, Wood Working Machinery, etc.

Brief Interviews With Leading Manufacturers and Dealers on the Present Situation and Prospects.

Pierson, Roeding & Co.—The rapidity with which Eastern principals came to the assistance of their Western agents is not only remarkable but exceedingly satisfactory. Pierson, Roeding & Co. were no exception to this rule, as their principals, as soon as telegrams could be received, promptly started Westward entirely new stocks of the electrical specialties handled by this firm. In one instance one of their larger principals not only sent stock but expressed a considerable quantity of gold, probably having the feeling that this would be the best stock they could supply.

Shipping documents have already been received showing that several carloads of Locke insulators, both glass and porcelain, are under way.

The Ohio Brass Company, well and favorably known in the street railway overhead construction business, have forwarded an entirely new stock of their various specialties. This stock will be very desirable, in view of the fact that the various trolley roads, both within and without the area of the affected district, will probably have requirements in this line as usual.

A stock of aluminum wire is also on the road, and in fact this company will be in a position to take care of the needs of their customers very promptly.

As indicated in various announcements, Pierson, Roeding & Co. will shortly take permanent quarters in the Monadnock Building, San Francisco, and with excellent storage facilities near the railroad, they are prepared to continue business in their special lines.

Abner Doble Company—We are resuming business on a scale larger than ever before. We have now under construction large, new and permanent shops and warehouses on the block bounded by Seventh, Hubbell and South streets, Potrero.

The United States Cast Iron Pipe and Foundry Company — The temporory office of this company is located at 951 Eddy Street, San Francisco. Their office was formerly at 620 Rialto Building. The pipe company believes there is a great future for San Francisco, and now intends to continue its office here permanently. They are in a position to fill orders promptly for cast iron water and gas pipe in all sizes from three inches to sixty inches in diameter.

John R. Cole Company—Mr. Cole said: "We have sold during the past two weeks goods amounting to $15,000, which shows that there is plenty of business for those who seek it. One of my principals, The Cutter Company, of Philadelphia, sent me $100 in coin with instructions to distribute it among those who had hard luck stories. Another Eastern house wired me to draw on them for any money I wanted."

Standard Electrical Works—Mr. Davis said: "We certainly lost no time in getting located, being the first on the ground. We are directly in the electrical center, within a stone's throw of our old address. Our shelving is all up and well filled with new stock. We have bought a new automobile for the use of our engineering department in making their necessarily rapid tours through the city. Contracts are rolling in, and altogether you may put us down as decided optimists on the present situation and future outlook."

Brooks-Follis Electric Corporation—We have received additional goods and many large orders. We have done more business during the last two weeks than during any four weeks in our experience.

Byron Jackson Pump Works — We build a new factory in Berkeley with a larger capacity than before and will shortly reopen our offices in San Francisco.

Century Electric Company—Our stock of goods has been largely augmented by recent deliveries of goods. We shall remove within thirty days to our new building on the corner of New Montgomery and Mission streets, San Francisco.

Westinghouse Electric and Manufacturing Company—A late delivery since the fire enables us to fill orders in many lines. Complete stock will be here on May 18th. Our Pacific Coast manager, W. W Briggs, is now in Pittsburg arranging matters with reference to our permanent location in San Francisco.

Henshaw, Buckley & Co.—Within ten days we shall return to our old location on Mission Street, corner of Fremont, San Francisco.

Allis-Chalmers Company, of Milwaukee, Wis., sent $3000 as a contribution to the public relief fund and $2000 to be distributed among their San Francisco employees. They have leased the ground floor at 602 Mission Street, San Francisco, and will shortly remove thereto.

Gould Storage Battery Company—Mr. Sharp said: "We are remaining in San Francisco and have a temporary office in the residence section, but will be located down town as soon as office room is available. We are prepared to take orders for storage batteries of all descriptions and make prompt deliveries. We have telephone connections in our temporary office, the number being West 837."

ASBESTOS FIRE-RESISTING ROOFING

And Sidings for temporary and permanent buildings. Affords greater fire-protection and is more easily and quickly handled and will LAST LONGER than galvanized iron. Absolutely waterproof. Guaranteed.

Deliveries made immediately upon receipt of order.

H. W. Johns-Manville Co.

1301 GOLDEN GATE AVENUE
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John R. Cole & Co.

Pacific Coast Sales Agents for

New York Insulated Wire Co.
The Cutter Company
American Circular Loom Co.
The Bossert Elec. Construction Co.

Have established temporary offices at

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Columbia Engineering Works

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Offer Quick Delivery of

STEEL CASTINGS

Made in their own steel foundry either from patterns furnished or from their own large assortment on hand
Boring, Key-Setting, Turning, Planing, Drilling, Milling or Fitting Work Done Promptly and Well

SEATTLE ELECTRIC COMPY.

907 FIRST AVE., SEATTLE

Offer Quick Deliveries for Stock of
ELECTRIC GENERATORS
ELECTRIC MOTORS, METERS
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INSULATORS, ELECTRIC
FIXTURES, ELECTRIC SIGNS
ELECTRIC WIRE, ELECTRIC
HEATING DEVICES, Etc.

West Coast Machinery Co.

Temporary office:

753 COLE ST. SAN FRANCISCO

THE ELECTRIC STORAGE BATTERY CO.

Temporary Offices

Rooms 1, 2, 3, 525 13TH ST., OAKLAND

Pelton Water Wheel company—Our new shops, bounded by Harrison, Nineteenth and Alabama streets, San Francisco, are well under way and will shortly be ready for occupancy. They were designed by Wynn Meredith, of the firm of Hunt, Dillman, Meredith & Allen. Thos. Day's Sons are the contractors.

The Northern Electrical Manufacturing Company write from Madison, Wis.: Our Pacific Coast sales manager, Mr. H. C. Parker, is on deck and prepared to give power transmission propositions prompt attention. His efforts will be backed by the factory in the way of promptest possible deliveries, thus insuring that the customers of the Northern Company will be served with all possible dispatch.

Charles C. Moore & Co.—We have 50 men working in clearing away the debris from our old business site, and we expect to have our new one story corrugated iron structure ready for occupancy within ten days. We have several large contracts taken since the fire, and the business outlook is very promising. Charles C. Moore was in New York at the time of the disaster and took the first "flyer" westward, reaching here four days afterwards.

The National Conduit and Cable Company—Mr. Pennoyer says: "We are temporarily over in Oakland, but will soon return to San Francisco. Our company is rushing stock to the Coast so that we shall be prepared to take care of all orders for waterproof, bare, transmission and trolley wire and lead sheathed paper insulated telephone, telegraph and power cables."

Van Emon Elevator Company—We have 44 to 52 Natoma St., S.F., all roofed in and machinery will be in place in 30 days. We have temporary shop tools, lathe, etc., on the way from San Jose and will be ready to work inside of one week. 52 to 54 will be two stories, all floored and ready.

Platt Iron Works—We have several carloads of machinery on the road, shipped before the fire, and have ordered several more from the factory, so that we will be prepared to deliver special pumps in from two to four weeks from our factory. We have just rented a large warehouse in Emeryville.

Lindgren-Hicks Company — We are kept hustling with plans for new buildings, in which reinforced concrete (a material with the application and increased use of which for building purposes we have been closely identified) largely figures. Our new building on Market Street, opposite Taylor, is already in process of erection.

PIERSON, ROEDING & CO.

Temporary Office, 23 BLAKE BLOCK, OAKLAND
Telephone Oakland 3678
Will locate permanently in Rooms 409-415 MONADNOCK BLDG., S. F., on June 1
Branch Offices: SEATTLE, LOS ANGELES
Successors to JNO. MARTIN & CO. and MARTIN PIPE AND FOUNDRY CO.
PACIFIC COAST AGENTS FOR

LOMBARD WATER WHEEL GOVERNORS
Governors adapted for every possible class of service.

VICTOR INSULATORS
Porcelain and Glass
FOR ALL VOLTAGES.
Made by LOCKE INSULATOR MFG. CO.

FIBRE CONDUIT FOR UNDERGROUND CIRCUITS
Cheaper and better than Tile or Paper.

RAILWAY OVERHEAD MATERIAL
RAIL BONDS
Made by OHIO BRASS COMPANY.

THE PITTSBURG REDUCTION COMPANY
Makers of ALUMINUM WIRE.

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Telephone OAKLAND 1284

Now building one story sheet iron structure for main office, on old site, 63 First Street, corner Mission Street, San Francisco, where we will be established within 10 days.

S. H. HARMON LUMBER CO.
FULL STOCK WIRE MOULDINGS
First and Brannan Streets, S. F.
Shipments arriving daily by water and rail. Send all remittances to 1921 Fillmore Street. Can leave orders at the above address.

Motor Generator Sets
For Lighting and Power
Built in all Capacities
NATIONAL BRAKE COMPANY
Successors to National Electric Coy., Milwaukee
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J. FRANK PERRY, Pacific Coast Manager.

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Have Reopened at
604 MISSION STREET
Ground Floor, Atlas Building, S. F.

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ROUND RED CEDAR
SAWN REDWOOD **POLES**
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IRON—STEEL
Temporary Offices
2611 BROADWAY, SAN FRANCISCO
Oakland Branch, 668 Broadway. Telephone, Oakland 585. New works under construction at Seventh and South Streets.

H. G. AYLSWORTH
ELECTRICAL SUPPLIES
Temporary Office:
Cor. CALIFORNIA AND PIERCE STS., S. F

The Builders' Exchange
Is located at 226 Oak St., nr. Gough, and about two blocks from Market Street, having leased the premises for two years. All members are invited to call and leave their new addresses with the secretary as soon as possible.
S. H. KENT, President.
JAMES A. WILSON, Secretary.

NEW FACTORY FULLY EQUIPPED
And ready to help build up GREATER SAN FRANCISCO
Drendell Switchboard Co.
ELECTRICAL MANUFACTURERS
Factory, 17th and Utah Streets, S. F

Dearborn Feed-Water Treatment Made to suit the water as per analysis, used regularly, keeps boilers free from scale and prevents any corrosive action the boiler water may have on the iron.
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MANUFACTURERS OF

WIRE and WIRE ROPE, ELECTRIC WIRES, CLOTH and NETTING

Are prepared to take care of orders. Large stocks at Los Angeles, Portland and Seattle; also en route to Oakland.

Temporary office:

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LIMA INSULATORS

THAT STAND THE TEST

High Voltage Transmission Insulators made from the best of Porcelain.

Exclusive Pacific Coast Agents

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Phone Oakland 7410

ELECTRICAL SUPPLIES AT WHOLESALE.

HOLABIRD-REYNOLDS ELECTRIC CO., 116 East Fifth Street, Los Angeles, representing The Electric Porcelain Co., Tubes and Insulators. Prices on this line have been reduced again. Better see us. Eureka Rubber Mfg. Co., Rubber Insulated Wires and Cables. Franklin Electric Mfg. Co. "Femco" Incandescent Lamps. Weber Electric Co., Weber Sockets, National Code standard. Manufacturers of Switchboards and Tablet Boards.

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Luitweiler Pumping Engine

The only Pumping Engine delivering constant stream of water without pulsation. Can be run by gasoline, steam or electric power on same base without belts.

Full descrpiptive Catalogue or Price List mailed on request.

Factory and Office

707-714 NORTH MAIN STREET

LOS ANGELES CALIFORNIA

Holabird, Reynolds & Sayles Co.—The fire, while it destroyed our San Francisco stock, was not the inconvenience to us that it would have been if we had not our main office and warehouses, with all our reserve stock, in Los Angeles. We shall soon start up here bigger than ever.

Trade Catalogues.

Steam Cant Flipper—In Bulletin No. 1705 of the Allis-Chalmers Company is a full description of the Steam Cant Flipper, which is designed to discharge cants, timber or lumber from live rolls to gangs or other machines. The bulletin is well illustrated and will be found useful to the lumber man.

Rock Crushing Plants—The Power and Mining Machinery Company, of Cudahy, Wis., in its catalogue No. 4, has thoroughly described the machinery it has for rock crushing plants. The catalogue is well illustrated and will be found of especial value to those persons engaged in this branch of industry.

Right Use of Light—The Portland General Electric Company has published an interesting booklet upon the electric light and its uses. It is really well worth reading, as it gives a comprehensive idea of the uses of the electric light and its value in advertising. In this booklet one can get a clear idea of how electricity has been utilized to further business and to what extent it is valuable to the large and also the small merchant. Electricity is used by the cigar man as by a city itself, and attention is called particularly to the great electric advertisement used by a growing city in Portland last summer which carried the legend "Watch Tacoma Grow."

Notice to Subscribers.

Although the Journal saved most of its records, considerable work is necessary in restoring them to their old time accuracy and completeness. We wish, therefore that any and all of our suscribers, who may read this notice, would write us, stating when their last payment was made on subscription and the date when same will expire. This will enable us to verify our own record and will prevent any confusion or delay in the forwarding of papers.

New subscribers will please not ask for any numbers previous to the fire as these cannot be supplied. The Journal for the coming year will be of great value and absorbing interest and we beleive that no electrical or machinery house or engineer, architect or contractor can afford to miss its weekly visits. Send in your subscriptions now so your files will be complete of the New Issue.

The John M. Klein Electrical Co.

Have Located Temporarily at

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Will remove shortly to

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Architects and Contractors

ATTENTION!

We have Oil Furnace 45 feet long, and Bending Floor specially adapted to straightening beams and structural shapes of all kinds. Also very heavy Hydraulic Presses for cold straightening.

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Experting Consulting Designing **ENGINEERS** Superintending Constructing Repairing

Also dealers in Engines, Boilers, Pumps, Valves, Fittings, Packing, Supplies.

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Phones: Main 2990, Ind. 1532.

Standard Electrical Works

We are already fairly well stocked and ready for business in our offices and warerooms on ground floor of

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R. J. DAVIS, President.

THE PARKER WATER TUBE BOILER

SECURES

GREATER ABSORPTION OF HEAT AND CONSEQUENT ECONOMY

No Wet Steam No Burnt Tubes
No Leaking

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WESTON ILLUMINATED DIAL STATION INSTRUMENTS

Manufactured by Weston Electrical Instrument Co. Main office and works, Waverly Park, Newark, N. J. New York office, 74 Cortlandt Street.

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Oakland Office, 405-408 Union Savings Bank Building
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Factory is uninjured. Orders filled promptly.
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Stock on Hand:

Williamson Double Swivel Vise.
Empire Dry Batteries.
Fair Telephones.
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WESTERN MANTLE CO.
Manufacturers of
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Large Stock on Hand for Quick Delivery
Office and Factory
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Kilbourne & Clark Co.

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De Laval Pumps, Dynamos, Blowers.
Pittsburg Transformers. Chicago Telephones. National Alternators.
Hercules Gas Engines, Marine, Stationary and Hoisting.

A Complete Line of Electrical Supplies.

News Notes.

Eureka, Cal.—The North Mountain Power Co. has been awarded the franchise for light and power in the town of Field's Landing.

San Francisco, Cal.—Chief Engineer Schussler of the Spring Valley Water Company gives out the encouraging information that within seven days the water supply of San Francisco will be nearly normal.

Spokane Wash.—"The Spokane & Inland railway will have its line completed from Spokane to Palouse and Colfax by January 1, 1907," said F. A. Blackwell, general manager of the company. The contractors have 800 men on the work.

Spokane, Wash.—A. B. Campbell of Spokane is one of the trustees and chief financial backers of the Columbia & Walla Walla Traction Company, incorporated for $3,500,000, to build an electric road in the vicinity of Dayton and Waitesburg of this state.

Portland, Ore.—Contracts have been let for building one of the largest power development plants on the Deschutes river about 30 miles south of The Dalles, under direction of the Interior Development Co. It contemplates the development of 50,000 horsepower for the generation of electricity, and it will cost in the neighborhood of $200,000.

Spokane, Wash.—The Coeur d'Alene & Spokane Electric Railway Company has made arrangements to extend its line from Coeur d'Alene a distance of eight miles to Hayden lake, one of the most popular summer resorts of this section. It is now reported that the line will be extended further for another distance of 14 miles to Lake Pen d'Oreille in northern Idaho, one of the finest bodies of inland water in the West.

San Fancisco, Cal.—A $10,000,000 coporation that will play an important part in the work of rebuilding San Francisco will be brought into existence when articles of corporation are filed with the County Clerk today. The coporation is to take the name of the Loss-Leonhardt-Deneen Company, will embrace much New York, San Francisco, and Los Angeles capital, and, in advance of the completion of its organization, has closed arrangements and made contracts for immense amounts of construction material that will soon be going into many big structures in the new San Francisco.

Tracy Engineering Co.

Pacific Coast Agents for

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Foundry, Machine and Wood Shop Work of all Descriptions. Prompt Delivery.

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Temporarily at

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CENTURY ELECTRIC CO.

Are temporarily located at their Branch Store,

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Stock of Branch Store complete and offers exceptional opportunity for supplying San Francisco market.

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Riveted Pipe, Water and Oil Tanks, Smoke Stacks and General Sheet Iron Work.

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Temporary address, 1059 Castro Street, Oakland
Our temporary building in San Francisco will be ready for occupancy in about 30 days.

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Phone East 18

Permanent address will be announced shortly.

Lord Electric Co.

Main office and factory, BOSTON, Mass.

Thomas Soldered RAIL BONDS

F. A. LAWSON & CO.
PACIFIC COAST AGENTS
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To Buyers on the Pacific Coast

We have recently issued a catalogue of electrical supplies. It contains 800 pages and is the most complete we have ever issued. It contains prices, standard package quantities, descriptions and illustrations. Every article has a telegraph code word and number
Approximate weights are given for all articles.
If you have not received a copy write us. The number of the catalogue is 24.

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EDECTRICAL SUPPLIES
264, 266, 268, 270 FIFTH AVENUE
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Northern Pacific Railway

Have opened

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THE JOHN BARRETT CO.,
408-410 Morrison Street, Portland, Oregon, can supply
Tile Flooring, Mantels, Electroliers, Incandescent Gas Lamps and Electrical Supplies.

T. P. ANDREWS
KODAKS TO RENT
SAN FRANCISCO

A. LEITZ & COMPANY
SURVEYING INSTRUMENTS
Established at 918 BROADWAY, OAKLAND
READY FOR BUSINESS

San Francisco, Cal.—The Merchant's Association have established offices at 1703 Gough St., San Francisco. A register is kept of all addresses of its members. The Merchant's Association met with an almost complete loss of its records, books, lists, etc., by the recent fire.

San Francisco, Cal.—Louis Schoenberg anounces that he will erect a steel building at the corner of Second and Jessie streets, and also two other building—one at the northwest corner of First and Stevenson streets, and the other at the southwest corner of Second and Stevenson streets. The Eugene Dietzgen Company has already been secured as a tenant for one of the proposed buildings.

White Salmon — The Washington Electric Railway & Power Co. filed articles of incorporation. Incorporators, James R. Wood, of Portland, E. C. Poets, O J. Smith, C. Guler, C. W. Moore, and E. A. Frost, of Trout Lake. Object is to build an electric railroad from the White Salmon landing through the town of White Salmon to Trout Lake, a distance of 28 miles. $250,000 will be expended by the company.

Portland, Or.—Articles of incorporation have been filed by the Oregon Coast & Eastern Railway Company to construct 1,200 miles of railroad in Oregon; capital stock $10,000,000. The line will be built from Humbolt Bay, Cal., up the coast to Portland and lines constructed through Central Oregon from Coos Bay to Snake river.

San Francisco, Cal.—The George A. Fuller Co. will open immediately in San Francisco an office with a complete building organization. It offers its services to assist in rebuilding the city. It has in its corps trained men, skilled in every branch of building construction, and unexcelled facilities for supplying building material of all sorts in unlimited quantities. They claim to have erected in different large cities more fireproof buildings than any other building concern in the world.

Spokane, Wash.—Delivery of three electric locomotives for the Spokane Inland is expected in six weeks. They weigh forty tons each and will pull a 400 ton train up a 2 per cent grade at eight miles an hour. The machines are made by the Baldwin Locomotive Works and the Westinghouse Electric Co. The locomotives are of the single-phase alternating current type.

Bremerton, Wash.—The battleship Oregon arrived and will have repairs aggregating $1,000,000 made upon her before she is again placed in commission.

STANLEY-G. I. Electric Mfg. Co.

A. C. Generators, Induction Motors, Transformers, Switchboards, Arc and Incandescent Lamps, Supplies

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STRUCTURAL ENGINEERS

Contractors for Fire-Proof Steel and Concrete Buildings

We have several buildings on filled ground in the vicinity of San Francisco, constructed of reinforced concrete, which are undamaged by the earthquake, and are prepared to undertake construction of this type of building at once.

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Several carloads of Compressors, Hoisting Engines, Steam and Electric Standard Safety Water Tube Boilers, Hunt Industrial Railway Track and Cars, Electric Generating Sets and other Machinery on the way and ready for shipment. Specifications and estimates given contractors for complete plants.
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GILLESPIE'S
IMPROVED INSULATOR PINS
are in use in most of the electrical transmission plants in the United States

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Manufacturers celebrated National Weatherproof, Bare, Transmission and Trolley Wire, Lead Sheathed Paper Insulated Telephone, Telegraph and Power Cables.

Temporary offices with Oakland Traction Consolidated, 708 SAN PABLO AVE., OAKLAND. C. H. PENNOYER, Pacific Coast Mgr.